"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

12

S

Elastic Deformation of Rolling-Mill Rolls. I. M. Pavlov and Ya. S. Gallay. (Metallurg, 1938, No. 10, pp. 68–79). (In Russian). The authors review previous work on the bending of rolls and consider the various expressions arrived at for the magnitude of the elastic deformation. These formulæ are generally too involved for practical use. For practical purposes the authors derive the following expression for the deflection of the rolls:

$$f = \frac{nPl^3}{384 \times E \times I}$$

where P is the pressure, E the modulus of elasticity of the material, l the effective length of the roll between the bearings, I the moment of inertia of the rolls and n a coefficient depending on the ratio of the width of the strip to the length l of the rolls. Using a special apparatus, the measured deflection of the rolls was found to agree to within 5–10% with the results calculated from the above formula. The formula should be useful for calculations in connection with the cambering of rolls.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, Igor' Mikhaylovich.

Laboratory manual on the theories pertaining to rolling-mill operations. Moskva, Gos. nauch.-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 194[illegible]. 13[illegible] p. (49-13135).

TS340.P3

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M., professor, doktor tekhnicheskikh nauk.

Equilibrium of forces in rolling with spread. Stal' 7 no.1: 39-48 '47. (MLRA 9:1)

1.Chlen-korrespondent Akademii nauk SSSR.2.Moskovskiy institut stali. (Rolling (Metalwork))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

4

B

The Problem of the Interaction of Tools for Mechanical Working With Plastically Deformed Bodies. (In Russian.) I. M. Pavlov. *Izvestiya Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk* (Bulletin of the Academy of Sciences of the USSR, Section of Technical Sciences), Jan. 1949, p. 85-99.

Critically analyzes modern theory concerning action of the tool in machining and metal-forming operations; and on the basis of Timoshenko's theory, studies the possibility of application of Hooke's generalized law. Proposed equations are interpreted for different variables.

Translation B-79119

METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

PAVLOV, I. M.

Pavlov, I.M., The theory of Lamination, (General principles for working metals with pressure), 1950. Reviewed by S.I. Gubkin, 627-34

immediate source clipping

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I. M.

[redacted] PA 169T51

USSR/Metals - Rolling Sep 50

"Electric Contact Method for Determination of the Speed of Rolled Metal," I. M. Pavlov, N. P. Ganin, I. V. Rudbakh, M. I. Kapustina, Moscow Inst of Steel imeni I. V. Stalin

"Zavod Lab" Vol XVI, No 9, pp 1074-1075

Describes equipment used for determining speeds of metal in rolling process by method of electric contacts. Speeds of front and rear ends of billet and circumferential speed of rollers are determined directly. Therefore, not only a lead, but also a lag may be determined

[redacted] 169T51

USSR/Metals - Rolling (Contd) Sep 50

experimentally. One of essential advantages of method is independence of measuring accuracy from variations in temperature of metal and rollers.

[redacted] 169T51

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

CTRSFL No. 45

Pavlov, I.M., The Th[illegible] [illegible] Lamination. (General principles for working metals with pressure). 1950. Re[illegible]ed by S.I. Gubkin. 627-[illegible]

Akademiya Nauk S.S.S.R., Doklady Vol. 79 No. 4

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, Ig. M.

"The Theory of Rolling"

Book Review in:
Vest Mash p. 90, Oct 51

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

AGEYEV, N.V.; PAVLOV, I.M.; SAMARIN, A.M.

[Problems in metallurgy] Problemy metallurgii. [Akademiku Ivanu Pavlovichu Bardinu k semidesiatiletiiu. Redaktsionnaia kollegiia: N.V.Ageev, I.M. Pavlov, A.M.Samarin. Otvetstvennyi redaktor A.M.Samarin]. Moskva, 1953. 483 p. (MLRA 7:6)

1. Akademiya nauk SSSR. 2. Chlen-korrespondent Akademii nauk SSSR. (Metallurgy)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

Pavlov, I. M.

Problems of Metallurgy. Academy of Sciences of the U.S.S.R. Moscow, 1953. Present-Day Problems in Rolling. I. M. Pavlov. (317–326). [In Russian]. Some of the problems in rolling-mill practice whose solution is most urgently required for the realisation of planned production increases in the U.S.S.R. are outlined, with indications of possible solutions. Characteristics of Final Deformations. V. G. Osipov. (327–364). Various parameters used for characterizing deformation are defined and their relationships discussed. Deformation curves in terms of different parameters are examined and the selection of optimal characteristics of deformation is considered. Ways for the Further Development of Reducing and Section Rolling-Mills. B. P. Bakhtinov and M. M. Shternov. (365–377). Various rolling-mill layouts, working methods, stand designs, and roll-pass designs are critically examined, and the past and future evolution of rolling-mill practice discussed. Some Rules Involved in the Rolling Process. M. L. Zaroshchinskii. (378–391). The rules involved in the following are considered: direction of movement of the metal at the deformation centre, the relation of spread to parameters of the deformation centre, dependence of the absolute spread on strip width and the influence of the division of the deformation into steps on spread. Influence of Outer Zones on Widening and Distribution of Speeds and Stresses across the Width of a Strip during Rolling. A. I.

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widely used treatments of deformation during rolling

PAVLOV, I.M.; SUVOROV, I.K., kandidat tekhnicheskikh nauk.

Effect of the outer parts of the strip on the deformation of metal rolling. Sbor.Inst.stali no.31:177-211 '53. (MIRA 9:9)

1.Chlen-korrespondent AN SSSR (for Pavlov)
(Rolling (Metalwork)) (Sheet metal)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M.; D'YAKOV, V.G., kandidat tekhnicheskikh nauk.

Correlation between coefficients of friction depending on the direction of displacement in shaping. Sbor.Inst.stali no.31: 221-241 '53. (MIRA 9:9)

1.Chlen-korrespondent AN SSSR (for Pavlov).2.Kafedra prokatki. (Deformations (Mechanics)) (Surfaces (Technology))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

PAVLOV, I. M.

~~GERM.~~

Pavlov, I. M. *Grundlagen der Metallverformung durch Druck.* (*Theorie des Walzens.*) (Übersetzt aus dem Russischen.) Zwei Bände. 21 × 15 cm. Pp., Band I, 364, with 208 illustrations; Band II, 252, with 367 illustrations. 1954, Berlin NW7 (Ost-Berlin): Verlag Technik. (DM 45.— the set.)

Title Translation: Basis for Metal Forming Through Pressure

M

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M.

Determining the coefficient of friction in tong rolling. Obr. met.davl. no.3:23-26 '54. (MIRA 12:10)

1. Chlen-korrespondent AN SSSR.
(Rolling (Metalwork)) (Friction)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M.; DIOMIDOV, B.B., kandidat tekhnicheskikh nauk.

Relation of metal hardening to its deformation diagrams. Sbor.Inst. stali. no.32:346-374 '54. (MLRA 10:5)

1. Chlen-korrespondent AN SSSR (for Pavlov)
(Metals--Hardening)
(Deformations (Mechanics))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M., professor, doktor tekhnicheskikh nauk; FEDOSOV, N.M., SIVERDENKO, V.P.; TARNOVSKIY, I.Ya., redaktor; LANGE, B.L. OKHRIMENKO, Ya. M.; VALOV. N.A., redaktor; SHPAK, Ye.G., tekhnicheskiy redaktor.

[Press working of metals] Obrabotka metallov davleniem. Pod nauchnoi red. I.M.Pavlova. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1955. 483 p. (MLRA 9:1)

1. Chlen-korrespondent AN SSSR (for Pavlov)
(Metalwork)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M.; KUPRIN, M.I., kandidat tekhnicheskikh nauk.

Investigating friction during hot rolling of steel. Sbor.Inst. stali no.33:154-192 '55. (MLRA 9:6)

1.Chlen-korrespondent AN SSSR (for Pavlov).2.Kafedra prokatki. (Rolling (Metalwork)) (Surfaces (Technology))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M.; BAZAN, Yezhi, kandidat tekhnicheskikh nauk.

Investigating sliding between rollers and metal in rolling. Sbor. Inst.stali no.33:246-297 '55. (MLRA 9:6)

1.Kafedra prokatki.
(Rolling (Metalwork)) (Deformations (Mechanics))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M.; SHEVAKIN, Yu.F., kandidat tekhnicheskikh nauk.

Investigating the rolling processes of thin-walled pipes.
Sbor.Inst.stali no.33:311-357 '55. (MLRA 9:6)

1.Chlen-korrespondent AN SSSR (for Pavlov).2.Kafedra prokatki.
(Rolling (Metalwork)) (Pipe)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I. M.

Pavlov, I. M. (Corr. Mbr., AS USSR), "Feasible Conditions of Processing by Pressure of Heat Resistant Materials."

in book Research on Heat Resistant Alloys, pub by Acad. Sci. USSR, Moscow, 1956, 160 pp.

Inst. Metallurgy im A. A. Baykov

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I. M. 137-58-4-6992

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 4, p 98 (USSR)

AUTHOR: Pavlov, I. M.

TITLE: Fundamental Principles of Modern Rolling Theory (Osnovnyye polozheniya sovremennoy teorii prokatki)

PERIODICAL: Tr. Nauchno-tekhn. o-va chernoy metallurgii, 1956, Vol 10, pp 12-43

ABSTRACT: The state of and problems facing the theory of rolling (R) are examined. Light is shed on questions having to do with the engagement of the metal by the rolls and with the conditions of force and velocity involved in the R process, transverse deformation in R, and the special features of R in passes, with a review of simplifications permissible in rolling theory.

D. Z.

1. Metals rolling--Theory

Card 1/1

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

PAVLOV, I. M.

9

6 ½ 4E2c

An Investigation of Rolling Conditions for Titanium Alloys. V. K. Belosevich, V. F. Kalugin, N. E. Korneev, I. M. Pavlov, I. G. Skugarev, and A. E. Shelest (Izvest. Akad. Nauk S.S.S.R., 1953, [Tekhn.], (10), 13-27). (In Russian). An alloy of tech. pure Ti with Al was investigated. Up to 950° C the structure is pure α; at temp. >1000° C. it is pure β, between 950° and 1000° C. both phases are present. Pure β has a higher plasticity than pure α, but, owing to higher rates of cooling, it undergoes a martensitic transformation and the "needles" formed have a lower plasticity than α. Gas solubility in the β phase is markedly higher than in the α phase, therefore a min. heating time must be used. Investigations of plasticity and resistance to deformation showed it more advantageous to roll at temp. >1000° C. The mech. properties at the transformation temp. may be reduced by hot rolling. 7 ref.—N. B.

MM

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PHASE I BOOK EXPLOITATION 601

Pavlov, Igor Mikhaylovich, Gallay, Yakov Samuilovich, and Astakhov, Ivan Gerasimovich

Rukovodstvo k uchebnomu laboratornomu praktikumu po prokatke (Manual for a Laboratory Course in Rolling-Mill Processes) 2d ed., rev. Moscow, Metallurgizdat, 1957. 5,000 copies printed.

Ed.: Golyatkina, A. G.; Tech. Ed.: Attopovich, M. K.

PURPOSE: The book is intended for students of metallurgical vuzes and for students in other fields taking a laboratory course in "Metal Working by Pressure".

COVERAGE: The book discusses the methods of conducting a laboratory course in metal rolling and roll-design (except pre-rolling). Basic theoretical information is given and necessary measuring devices and instruments are described. The work assignments in this manual are coordinated with the following text books:

~~Card 1/12~~ 1/11

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I. M.

136-7-12/22

AUTHORS: Pavlov, I.M. (Corresponding Member of the Academy of Sciences of the USSR) and Piryazev, D.I. (Engineer).

TITLE: Forces in the cold rolling of tubes. (Usiliya pri kholodnoy prokatke trub).

PERIODICAL: "Tsvetnyye Metally", 1957, No.7, pp.63-70 (USSR).

ABSTRACT: In the investigation described the full force of the metal and its distribution on the rolls, the pressure and the axial force were measured for the rolling of tubes of type АМГ and Д1 aluminum alloys, type Л62 and Л68 brasses, cupronickel on ХПТ-32, ХПТ-$1^1/_2$", ХПТ-$2^1/_2$" and ХПТ-75 mills. Forces were measured with resistance strain gauges and oscillographic registration. Different pass designs were used. The use of smoothly-developing pass design gave more even pressure distribution than did a four-zone system and the adoption of the former enables mill productivity and tube quality to be improved. A two-fold increase in feed increases pressure on the rolls by 1.3-1.5, doubling the wall thickness of the blank increases pressure by 1.2 with forward and 1.3 with reverse operation of the stand for a constant value of the linear displacement of the metal. In the range (10-80 double operations per minute) investigated pressure does not de-

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pend on the number of double operations of the stand. The graph of the distribution of pressure over the length of the centre of deformation is of the domed shape characteristic of a two-zone centre. The pressure in the plane of the apex of the pass is distributed unevenly, the maximum lying approximately in the middle part of the pass. The mean pressure hardly depends on feed and a formula for the calculation of the mean pressure is proposed which is sufficiently accurate for practical purposes. The axial force is distributed unevenly along the length of the pass with forward and reverse working of the stand, and amounts to 2.5 - 10% of the pressure on the rolls. Axial forces are least with oil-graphite lubrication and greatest when mineral oil is used. The results of the investigation are represented graphically, and a typical oscillogram is shown. Details are also given of the pass design used. There are 9 figures, 3 tables and 3 references, two of them Slavic.

AVAILABLE: Library of Congress

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

137-1958-3-4984

Establishment of an Operational Scheme for the Loop Holders (cont.)

at the motor be increased from 8-9 v to 15-18 v, which should reduce the time required for the raising of the loopholder lever to 1.5 - 1.8 seconds.

P. G.

Card 2/2

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

PAVLOV, I.M.; DAVIDKOV, P.I.; PIRYAZEV, D.I.

Using a roller torsiometer for determining the coefficient of friction during metal rolling. Zav.lab.23 no.2:236-238 '57.
(MIRA 10:3)

1. Moskovskiy institut stali.
(Physical instruments) (Rolling (Metalwork))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

Pavlov, I.M.

137-1958-3-4971

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 3, p 72 (USSR)

AUTHORS: Pavlov, I.M., Kurdyumova, V. A.

TITLE: On the Relationship Between the Deformations in the Rolling Process (K voprosu o sootnoshenii mezhdu deformatsiyami pri prokatke)

PERIODICAL: Sb. Mosk. in-t stali, 1957, Vol 36, pp 259-276

ABSTRACT: An investigation of the relationship between the deformation (D) in the process of rolling was carried out on specimens (S) of ShKh15 steel of square and rectangular cross sections and a dimensional ratio H/B = 0.3 - 1.33; the S were passed through rolls of 148.5 mm, 220 mm, and 360 mm in diameter, with the reduction varying between 10 percent and 55 percent. The velocity of rolling amounted to 0.42 - 0.45 m/sec, and the temperature was maintained at 1100°. Graphs were obtained showing the longitudinal and transverse D's in an S, for various height-to-width ratios, as a function of the relative reduction. Investigations were also performed to determine how the dimensions of the D area vary with the degree of relative reduction and with the ratios of the specimen's height to its width and to the diameter

Card 1/2

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I. M.

137-1958-2-2780

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 82 (USSR)

AUTHORS: Pavlov, I.M., Fishgol'd, R.

TITLE: Investigation of the Conditions of Seizure and of the Stationary Rolling Process (Issledovaniye usloviy zakhvata i ustanovivshegosya protsessa prokatki)

PERIODICAL: Sb. Mosk. in-t stali, 1957, Nr 36, pp 277-311

ABSTRACT: The greatest possible angle of seizure when the rolling process is in stationary operation, α_y, is larger than the angle of seizure at the inception of the rolling process. $K = \alpha_y / \alpha_z > 1$. K is dependent on the method of feeding the metal into the rollers (freely or under constraint), the distribution of the pressure over the contact surface, the amount of transverse spreading, and the shape of the contact surface. The composition of the metal does not influence K substantially. As the transition is made from cold rolling to hot rolling, the decrease of K is approximately linear. K attains a value of 2 in cold rolling; this is accounted for by the cold hardening of the metal as it passes between the rolls, which causes an additional displacement of the equivalent force toward

Card 1/2

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137-1958-2-2780

Investigation of the Conditions of Seizure and of the Stationary Rolling Process

the exit. When strips are rolled in smooth rolls, K = 1.35 - 2.25; when a round section is rolled in smooth rolls, K attains a value of 2.75. At a given temperature K depends on the ratio of the drop in the coefficient of friction β_y / β. As the transition is made from the incipient seizure to the stationary rolling process, the coefficient of friction remains practically constant in cold rolling; in hot rolling it decreases by no more than 40 percent Experimental data confirm the existence of a large excess of friction forces in the stationary rolling process. Practical methods for utilization of this excess must be worked out, because the metals will safely stand greater reduction.

Ya.G.

1. Rolling mills--Processes--Analysis

Card 2/2

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

137-1958-3-4970

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 3, p 72 (USSR)

AUTHORS: Pavlov, I. M., Kurdyumova, V. A.

TITLE: The Widening of Metal During Rolling and Its Components (Ushireniye metalla pri prokatke i yego sostavlyayushchiye)

PERIODICAL: Sb. Mosk. in-t stali, 1957, Nr 36, pp 312-319

ABSTRACT: Investigations were carried out in order to determine how the widening (W) components are affected by the degree of deformation (D), the method employed in changing the degree of reduction, the shape of the D area, and the relationship between the dimensions of the strip and the diameter of the rollers. Specimens of ShKh15 steel with a dimensional ratio $H/B = 0.3 - 1.33$ were employed. The rolling was carried out in rollers of 148 mm, 220 mm, and 360 mm in diameter, at a temperature of 1100° and a velocity of 0.42 - 0.46 m sec. Three versions were employed in the rolling process: H - constant, h - constant, and Δh - constant. The shape of the D area was defined by the ratio of its length to its mean width (l/B_c). The investigation yielded data defining the relative W as a function of the dimensions of D area (l/B_c) at a constant relative reduction. Also obtained were

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137-1958-3-4970

'The Widening of Metal During Rolling and Its Components

data defining the relationship of the W components of the total W as a function of the relative reduction. The W is primarily affected by the degree of D and by the shape of the D area. The relationship of the W components varies with the conditions of the process: the fractional W of the central layer decreases with an increase in reduction, while the fractional W due to slippage increases, and the fractional W caused by the transformation of the lateral surfaces increases only initially and then diminishes.

Yu. F.

Card 2/2

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PAVLOV, I. M.

18(2) PHASE II - ABSTRACTS AB-1

Akademiya nauk SSSR. Institut metallurgii

Titan i yego splavy; metallurgiya i metallovedeniye (Titanium and Its Alloys; Metallurgy and Physical Metallurgy) Moscow, Izd-vo AN SSSR, 1958. 209 p. 4,000 copies printed.

Resp. Ed.: N.V. Ageyev, Corresponding Member, USSR Academy of Sciences; Ed. of Publishing House: V.S. Rzheznikov; Tech. Ed.: A.A. Kiseleva.

INTRODUCTION: This book, of which a Phase I Exploitation (SOV/1200) has been prepared, is a collection of scientific papers devoted to the study of titanium and its alloys from three main points of view: physical metallurgy, forming, and welding. Special problems investigated include structural changes occurring during welding, determination of the content of harmful gases, development of industrial methods of rolling, and oxidation at various temperatures.

PART I. PHYSICAL METALLURGY

Card 1/43

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and measurement of hardness during isothermal holding at heat makes it possible to trace the rate and duration of the hardening process and to make a proper choice of aging conditions for the alloys. There are 5 figures, 7 tables, and 3 references (2 Soviet and 1 English).

PART II. FORMING OF TITANIUM AND TITANIUM-BASE ALLOYS

Pavlov, I.M. (Institute of Metallurgy, USSR Academy of Sciences)
General Conditions for Forming Titanium and Its Alloys 124

Titanium and its alloys require special conditions for hot and cold forming. Cold deformation of Ti (alpha phase), as in other metals with a hexagonal structure (Mg, Zn, etc.), is accompanied by marked twinning. Cold ductility of Ti is greater than that of these other metals because of the greater number of possible slip and twinning planes. In a single cold-forming operation, Ti and its commoner alloys can be deformed by not more than 30 percent. With fractional (or repeated) deformation the figure can be brought up to 80 percent. Cold working in a particular direction causes anisotropy to develop. The crystal anisotropy is weak, but the mechanical anisotropy rises sharply when car-

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bide inclusions are present in significant amounts. Ti loses its ductility at temperatures below 20° C, but becomes more and more ductile as the temperature is increased. Titanium as cast is less ductile than hot-worked titanium. The foregoing considerations make it advisable to improve the purity and structure of the ingots. "Warm working" (at 200-400° C) is preferable to cold working. Titanium and its alloys are sufficiently ductile in the alpha range to permit forming though large ingots require heating to the beta range. The beta phase can be stabilized only with difficulty, e.g. by adding Cr in amounts above 7 percent. In the rapid cooling of ordinary Ti alloys from the beta range, a martensitic type of transformation takes place with formation of the "alpha phase of quenching" (commonly designated α'). This leads to increased hardness and tendency to brittleness. Experience has shown that hot working of Ti alloys followed by ordinary cooling may result in a low-quality product as compared with that obtained by forming in the alpha range. In hot working of heavy ingots at temperatures above the transformation range there is an intensification of these phenomena. Oxidation and gas absorption rates increase with higher temperatures. For heating large items to the beta range, especially to temperatures of the order of 1000° C, special protective measures are need-

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ed: inert gas, vacuum, coating, etc. The same applies to thinner items (less than 5 mm,) heated to 600° or above. With rapid induction heating, however, it is possible to dispense with such measures. With an increase in temperature the rate of oxidation is accelerated and the structure of the oxide layer deteriorates becomining powdery and nonprotective. When metal of low ductility must be formed, special measures have to be taken to assure maximum uniformity of deformation, such as matching the contours of blank and forming tool, lubrication of contact surfaces, use of padding between tool and blank, use of flat end grooves filled with a pliable material, etc. Prevention of harmful internal stresses from developing is best achieved by keeping the blank under compression from all sides, e.g. in tight-fitting closed dies leaving enough room for plastic deformation, or by rolling in tight rolls or on special rolling mills which accomplish reduction in longitudinal and transverse directions simultaneously, etc. Good results can be obtained by slowing down the rate of deformation, which may be explained by the fact that a more complete recrystallization has time to take place. The author gives various ways of economizing metal such as use of ingots and blanks of maximum possible size and of dimensions close to those ultimately required, precise spe-

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cifications for production conditions, etc. There are 3 figures, 1 table, and 9 references (all Soviet).

Danil'chenko, A.N. (Institute of Metallurgy, USSR Academy of Sciences) Ductility of IMP-1 and IMP-2 Alloys 134

This paper gives the results of an investigation of the plastic properties of the titanium-chrome alloys IMP-1 and IMP-2. A concurrent determination of the specific energy required for deformation of these alloys at various temperatures was made. Raw material for the tests consisted of ingots, up to 8 kg, which were forged into bars and strips, from which, after annealing, specimens were made. The following tests were made on the specimens: impact upsetting, impact tension, impact toughness, and rollability. The impact-upsetting test was made on cylindrical specimens 15 mm. in diameter, 20 mm. in height, approximately 16 g. in weight, using a vertical hammer with a work capacity of 342 kg-m. (weight of head: 90 kg, drop height 3.8 m.) at various temperatures from 20° to 1300°C. Under these conditions the specimens underwent a maximum deformation of up to 90 percent at temperatures of 900° and above (absolute deformation from 20 to 2 mm.). The plasticity diagram for IMP-1 alloy (plasticity versus temperature) shows three sharp-

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PAVLOV, .. M.

18(0) PHASE I BOOK EXPLOITATION SOV/1738

Akademiya nauk SSSR. Institut metallurgii

Sovremennyye problemy metallurgii (Modern Problems in Metallurgy) Moscow, Izd-vo AN SSSR, 1958. 640 p. 3,000 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Eds. of Publishing House: V.S. Rzhevaikov, and A.N. Bernov; Tech. Ed.: T.V. Polyakova.

PURPOSE: This book is intended for scientific and technical personnel in the field of metallurgy.

COVERAGE: This is a collection of articles on certain aspects of Soviet metallurgy. The book is dedicated to Academician Ivan Pavlovich Bardin on the occasion of his 75th birthday. The book is divided into seven parts. The first part consists of two articles presenting a brief account of the biography and professional activity of the Soviet metallurgist. It includes an article by John Chipman, Nicholas Grant, and John Elliott (M.I.T., USA) describing their meeting with Bardin in Moscow and also his visit to the United States. The second part consists of three articles and deals with raw materials and fuels for the Soviet metallurgical industry. The third part represents the major portion of the book. It consists of 25 articles dealing with the various aspects of the metallurgy of pig iron and steel. The fourth part consists of two articles treating the metallurgy of nonferrous metals. The fifth part consists of three articles on the forming of metals. The sixth part consists of eight articles discussing certain aspects of physical metallurgy. The last part deals with general problems in the field of metallurgy. References are given after each article. No personalities are mentioned.

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Modern Problems in Metallurgy SOV/1738

FORMING OF METALS

SCIENCE OF METALS

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

SOV/163-58-1-21/53

AUTHORS: Pavlov, I. M., Krupin, A. V.

TITLE: Investigation of the Influence of the Defects in Metals on the Distribution of Tension (Issledovaniye vliyaniya defektov v metalle na kontsentratsiyu napryazheniy)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 1, pp 111-116 (USSR)

ABSTRACT: The following influences on the distribution of tension were found:
1) Shape, dimensions and the ratio between the dimensions of the defects
2) The orientation of the defects with respect to the effective forces
3) The elastic properties of the fillers
4) The interaction of the concentrations
5) The character of the applied external forces.
The individual actions were discussed in detail. With regard to point 1) it was found that various geometrical shapes of the defects cause different concentrations of tension. The experimental results show that the coefficient of the tensional con-

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SOV/163-58-1-2?/53

Investigation of the Influence of the Defects in Metals on the Distribution of Tension

centration C is equal to $\frac{\sigma_m}{\sigma_n}$, i.e., that this coefficient increases according to the increase in the length of the defect in the direction vertical to the effective force.

The influence exerted by the fillers of the groups 1, 2, 3, and 4 on the tensional concentration of the defects of various geometrical shapes was investigated. The coefficient of the tensional concentration with fillers of the first group at $E_3 > 0$: C = 6,5.

The coefficient of the tensional concentration with fillers of the fourth group at $E_4 > E_0$: C = 2,6.

The character of the fillers influences the tensional state of the bodies. There are 3 figures and 6 references, 6 of which are Soviet.

Card 2/2

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: October 4, 1957

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

SOV/163-58-1-27/53

AUTHORS: Pavlov, I. M., Dun De-Yuan'

TITLE: Combined Cylindrical Torsion Meter (With Incision) (Sostavnoy [s razrezom] valkovyy torsiometr)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 1, pp 146-149 (USSR)

ABSTRACT: A new cylindrical torsion meter (with incision) was devised which separates the mobile annular parts of the cylinders into two independent halves.
The scheme of this combined cylindrical torsion meter (with incision) is given. There are two measuring boxes for the determination of the frictional forces built into this instrument. The effect of the frictional forces on the boxes is transferred to the measuring boxes by the mobile annular parts. The contact faces of these annular halves are carefully polished. The changes in the effect of the frictional forces T_1 (1) and T_2(2) are represented graphically in the measuring boxes M_1 and M_2, depending on the position of the incision.
This torsion meter makes it possible to determine the character

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

SOV/163-58-2-25/46

AUTHORS: Pavlov, I. M., Tun De-yuan'

TITLE: Sectionally Assembled Measuring Instrument of Contact Frictional Forces (Sostavnoy (s razrezom) izmeritel' kontaktnykh sil treniya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 2, pp. 147-149 (USSR)

ABSTRACT: The construction of a measuring instrument for the direct determination of the total friction and of the friction coefficient is described. The instrument suggested makes it possible to determine the perfection of the basis for the theory of the rolls and to investigate it experimentally, especially as regards the equilibrium forces in rolling and the ratio between α and the angle of friction β, as well as of the critical angle γ. The effect of the mono- and bi-sectionally assembled and symmetrically arranged instrument of the contact frictional forces is described. To ... easier the displacement of the movable parts of the instrument also a sectionally assembled tilting torsion meter was suggested. The section between the two movable parts can, in dependence

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Sectionally Assembled Measuring Instrument of Contact Frictional Forces SOV/163-58-2-25/46

on the conditions of investigation, be displaced to any place between the center and the outer edge of the surface. The construction suggested is suited for investigations of the contact frictional forces in pressing back bodies to various shapes, from flat plates to plates with spherical and cylindrical face
There are 4 figures.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: October 1, 1957

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

AUTHOR: Pavlov, I. M. SOV/163-58-2-30/46

TITLE: Experimental Conditions in Rolling Without Any Passing of the Sheet-Metal Strip Through the Rolls (Opytnyye usloviya prokatki bez propuskaniya polosy cherez valki)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 2, pp 170-171 (USSR)

ABSTRACT: For more accurate determinations of the operation of the motion in rolling as well as for all other investigations of metal strips of infinite length the direct rolling of the metal by the method of "pressing wheels" is employed. The detachable wheels are mounted to one and the same roll. In doing so the width of the corresponding metal strip on the wheels, and their position on the rolls can be fixed. Their correct mounting as well as the necessary width of the wheels secures the coincidence of the elastic deformation of the rolls with the deformations formed in the normal process. To remove the frictional effect between the metal strips and the caliber wheels with cuneiform grooves and protracting crests are used. Also other types of wheels were suggested. Generally the method of "pressing wheels" offers great possibilities of

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Experimental Conditions in Rolling Without Any Passing of the Sheet-Metal Strip Through the Rolls SOV/163-58-2-30/46

reproducing the conditions of forces of the normal rolling processes without any passing of the metal through the rolls.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: December 10, 1957

Card 2/2

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

AUTHORS: Pavlov, I. M., Shelest, A. Ye. SOV/163-58-3-27/49

TITLE: Investigation of the Resistance to Deformation in the Hot Punching of Titanium and Its Alloys (Issledovaniye soprotivleniya deformatsii titana i yego splavov pri goryachey prokatke)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 3, pp 161 - 164 (USSR)

ABSTRACT: The present paper contains the results of the investigations of the resistance to deformation in the hot punching of titanium and titanium alloys. Titanium was produced by means of the calcium hydration method and powder metallurgy. The following samples were used IMP -1, VT-1D and titanium alloy with aluminum, type VT-5D . Titanium and its alloys have technical properties similar to those of stainless steel. The investigations of the resistance to deformation of titanium samples and of steel samples of the type 1Kh18N9T were compared to each other. The resistance to deformation is determined by the following formula:

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Investigation of the Resistance to Deformation in the Hot Punching of Titanium and Its Alloys SOV/163-58-3-27/43

$$P = \frac{P_{gen}}{S_x} = \frac{P_{gen}}{\frac{B_1 + B_2'}{2} \cdot \ell_x} .$$

The dependence of the resistance to deformation on the temperature in the hot punching of titanium samples IMP-1 and the steel sample 1Kh18N9T is graphically represented. From the investigations carried out may be concluded that the resistance to deformation of stainless steel in punching increases uniformly with the temperature. However, the resistance to deformation in titanium samples in the case of an increase of the stamping temperature to 950°C takes place non-uniformly. The resistance to deformation of titanium depends only little on the temperature and is 2-2,5 times smaller than the resistance to deformation of the steel sample 1Kh18N9T. By dropping the punching temperature the resistance to deformation of titanium suddenly increases and at a temperature of 800° approaches the value of the resistance to deformation

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of the steel sample at this temperature. Elements alloyed with titanium not only change their properties but also their resistance to deformation in punching. It is recommended to punch titanium alloys at a temperature where the β-modification of titanium exists, and to stop this treatment at temperatures where the transition from β-titanium to α-titanium takes place. There are 4 figures and 1 reference, which is Soviet.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute) Institut metallurgii AN SSSR (Institute of Metallurgy, AS USSR)

SUBMITTED: December 10, 1957

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

SOV/[illegible]

AUTHORS: Pavlov, I. M., Medis, V. Ya.

TITLE: The Dependence of the Mechanical Properties and the Micro Structure of Metals on the Change of the Signs of Plastic Deformation (Zavisimost' mekhanicheskikh svoystv i mikrostruktury metalla ot izmeneniya znaka kholodnoy plasticheskoy deformatsii)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 3, pp 172 - 180 (USSR)

ABSTRACT: The characterization of the physical state of a deformed metal by determining the extent of the composite deformation is not satisfactory. It is necessary to take into account the change of the signs of the deformation. In the present paper investigations of the dependence of the properties of the metals deformed on the change of the signs of the deformation were carried out, and the character of the change in strength of the alloys according to the change of the signs of the plastic deformation was determined. Pure metals (aluminium metal and technical iron of the Armco type) were used for this purpose. The samples were investigated as to their strength and their

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The Dependence of the Mechanical Properties and the Micro Structure of Metals on the Change of the Signs of Plastic Deformation SOV/[illegible]

microstructure. From the results obtained may be concluded that the strength of the alloys increases with the increase of the degree of deformation. The hardness of metals after deformation with variable signs is smaller than that of metals after deformation with constant signs. The change of the signs of plastic deformation as well as all anisotropic properties of the metals were investigated in their longitudinal and their vertical direction and it was found that the change of the signs of plastic deformation has an effect on the microstructure of the metal samples. Such an effect was found in aluminium samples and in technical iron. In the working processes of the metals it is necessary to take into account the change of the signs of plastic deformation. There are 5 figures and 6 references, all of which are Soviet.

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

The Dependence of the Mechanical Properties and the SOV/163-58-3-29/49
Micro Structure of Metals on the Change of the Signs of Plastic Deformation

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)
Institut metallurgii AN SSSR (Metallurgical Institute, AS USSR)

SUBMITTED: March 10, 1958

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

PAVLOV, I.M.; MEZIS, V.Ya.

Effect of directional change in plastic deformation on certain properties of the metal. Trudy Inst.met. no.3:295-306 '58. (MIRA 12:3)
(Deformations (Mechanics)) (Metallography)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

18(0)

AUTHORS: Pavlov, I. M., Shelest, A. Ye.

SOV/163-58-4-24/47

TITLE: Investigation of the Initial Stage in Rolling and the Transition to the Stabilized Process (Issledovaniye nachal'noy stadii prokatki i perekhoda k ustanovivshemusya protsessu)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 4, pp 141-148 (USSR)

ABSTRACT: On account of the examination made here, the following is stated: 1) A comparison of different methods of determining the minimum length of the frontal outside strip end in rolling (Ref 3) shows that the easiest and sufficiently accurate method is the one basing on the measurement of the full pressure of the metal on the rolls and the recording on an oscillograph (Ref 4). 2) The increase of the full pressure after the filling of the roller opening may be explained by the supporting effect of the frontal outside strip end, leading to an increase of the metal deformation resistance. In rolling stainless steel, the supporting effect of the outside end is always greater than in rolling titanium. 3) The speed of the frontal strip end after gripping becomes constant after the discharge of the frontal end of a certain length (corresponding to the minimum

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Investigation of the Initial Stage in Rolling and the Transition to the Stabilized Process SOV/163-58-4-24/47

length of the outside end) out of the rollers. 4) At the moment of filling the roller opening with metal, the critical angle is smaller than the critical angle of the stabilized process stage. The latter angle is determined by the lead. The critical angle becomes greater during the initial process and the development of the lead zone at the expense of the utilization of the reserve frictional forces. It becomes the greater, the more the frictional coefficient of the rolling metal increases. 5) The minimum length of the frontal outside strip end may be determined by measuring the width of strip throughout its length (Ref 3). In this case, the frontal outside strip end may have either a fan-shaped or a narrowing form. 6) Well comparable results were obtained by all methods for determining the minimum length of the frontal outside strip end in rolling (by the general pressure, by the speed of the frontal end and by the spreading). This confirms the correctness of theoretical ideas as to the importance of the outside parts of the deformed body ("theory of rigid ends") (between quotation marks in the Russian original), as to the concept of

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

Investigation of the Initial Stage in Rolling and the Transition to the Stabilized Process SOV/163-58-4-24/47

"minimum length" (between quotation marks in the Russian original) of the outside parts, as to the limiting processes from one rolling stage to another, etc. There are 5 figures, 2 tables, and 4 Soviet references.

ASSOCIATION: Moskovskiy institut stali i institut metallurgii AN SSSR (Moscow Steel Institute and Institute of Metallurgy AS USSR)

SUBMITTED: January 29, 1958

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

SOV/24-58-6-30/35

AUTHORS: V.Ya. Mezis and I.M. Pavlov

TITLE: On the Specific Character of the Microstructure and on the Anisotropy of the Mechanical Properties of Metals observed after Cold Plastic Deformation of Changing Sign (Ob osobom kharaktere mikrostruktury i anizotropii mekhanicheskikh svoystv metalla, nablyudayemykh v rezul'tate kholodnoy plasticheskoy deformatsii peremennogo znana)

PERIODICAL: Izvestiya akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 6, pp 142-144 (USSR)

ABSTRACT: The experimental test pieces measuring 7 x 4 x 3 cm were prepared from pure copper, commercially pure aluminium and armco iron. After bright annealing in a protective atmosphere, to produce a homogeneous microstructure and sufficiently large grains, the test pieces were subjected to cold plastic deformation, (a) in tension and (b) in tension followed by compression. From the deformed materials test pieces were cut in the direction parallel and perpendicular to the direction of the deformation, and these test pieces were used for hardness measurements and determination of ultimate tensile strength, proof stress

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

SOV/24-58-6-30/35

On the Specific Character of the Microstructure and on the Anisotropy of the Mechanical Properties of Metals observed after Cold Plastic Deformation of Changing Sign

and ductility of the material. After deformation of various kinds the microstructure of the various metals was examined. It was found that: (a) The general character of the relationship between the degree of work hardening and the total deformation, both uni-directional and alternating, is the same; work hardening increases with increasing degree of total deformation. (b) The difference in the properties in the perpendicular direction resulting from alternating deformation in aluminium and commercial iron reached 16 to 18% for the ultimate tensile strength, and up to 32% for the ductility. (c) The character of anisotropy is also affected by alternating the deformation: In the case of uni-directional deformation the ultimate tensile strength and proof stress of the test pieces cut in the direction parallel to the direction of the deformation were higher than those of the test pieces cut in the perpendicular direction, whilst, after alternating deformation, the tensile strength and proof stress were higher in the perpendicular direction.

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

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On the Specific Character of the Microstructure and on the Anisotropy of the Mechanical Properties of Metals observed after Cold Plastic Deformation of Changing Sign

However, in a number of cases, for instance in the case of pure copper, no effect of alternating deformation was observed. The effect of alternating deformation on the mechanical properties and their anisotropy is best explained by the difference in the shape of various stress risers (micro-defects) present in the metals and by variation in their orientation in relation to the direction of the applied stress. The main effect of alternating deformation appears to be on the microstructure (Figs 1-7). Metal subjected to alternating deformation in comparison with that subjected to unidirectional deformation of the same degree is characterised by the following features: (a) absence of fibrous structure. (b) a grain shape similar to that of the undeformed metal. (c) presence in the grains of sets of slip lines intersecting at right angles. (d) a final form of the microstructure which indicates that deformation occurs mainly inside the grains and only to a very

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

SOV/24-58-6-30/35

On the Specific Character of the Microstructure and on the Anisotropy of the Mechanical Properties of Metals observed after Cold Plastic Deformation of Changing Sign

small degree along the grain boundaries. It was established that alternating deformation does not affect the microstructure in the same degree as unidirectional deformation. In spite of this difference in the microstructure, in many cases (eg in the case of Cu) the mechanical properties of metal after both types of deformation were similar. This indicates that work hardening after cold plastic deformation is associated, not with changes of structure visible under a microscope, but with changes of the character and disposition of dislocations occurring inside the grains.

There are 7 photomicrographs and 2 Soviet references.

SUBMITTED: March 17, 1958

Card 4/4

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M., prof.; SHEVAKIN, Yu.P., kand.tekhn.nauk; SEYDALIYEV, Yu.S., inzh.

Using sulfurous molybdenum as a lubricant in the cold rolling of pipe. Izv. vys. ucheb. zav.; chern. met. no.7:191-193 Jl '58. (MIRA 11:10)

1. Moskovskiy institut stali. 2 Chlen-korrespondent AN SSSR (for Pavlov).

(Metal-working lubricants)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

SOV/137-58-11-22333

Translation from: Referativnyy zhurnal. Metallurgiya, 1958, Nr 11, p 69 (USSR)

AUTHORS: Pavlov, I. M., Krupin, A. V.

TITLE: An Investigation of Defects in Metals by Photoelastic Means (Issledovaniye defektov v metalle metodom fotouprugosti)

PERIODICAL: Sb. Mosk. in-t stali, 1958, Vol 38, pp 307-325

ABSTRACT: Results are presented of an investigation of the influence of microscopic inclusions (sizes, shapes and orientation) upon stress concentrations in bodies subjected to loads. The investigation was by photoelasticity, specimens of optically active material being used in which the value of a line was $\tau_{o}^{1.0}=6.1$ kg/cm^2. The instrument used was the PPU-4, developed by the Institute of Mathematics and Mechanics of Leningrad University. It is established that defects in the metal are stress concentrators which reduce the strength of alloys of low ductility. The concentration of stresses increases with increase in defect length in a direction normal to the line of action of a load. The relative positions of the defects, their geometrical shapes and dimensions, and the properties of the material with which the defect is filled, all affect the stress concentration. If the E of the filler

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

An Investigation of Defects in Metals by Photoelastic Means SOV/137-58-11-22333

is higher than the E of the specimen, the concentration of the stresses diminishes.

M. Z.

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I. M.

Akademiya nauk SSSR. Institut nauchno-tekhnicheskoy informatsii

Metallurgiya i metallovedeniye; khimiya, metallovedeniye i obrabotka titana (Metallurgy and Metallography; Chemistry, Metallography, and Treatment of Titanium) Moscow, Izd-vo AN SSSR, 1959. 383 p. (Series: Itogi nauki; tekhnicheskiye nauki, 2) Errata slip inserted. 2,700 copies printed.

Ed.: N. V. Ageyev, Corresponding Member, Academy of Sciences, USSR; Ed. of Publishing House: V. S. Rzhevnikov; Tech. Ed.: Yu. V. Rylina.

PURPOSE: This collection of articles is intended for metallurgists working with titanium and titanium alloys.

COVERAGE: The articles in this collection deal with the chemistry, metallurgy, and machining of titanium and titanium alloys. The articles are based on abstracts appearing in the Referativnyy zhurnal for chemistry and metallurgy, from 1953 to 1955. For the most part the articles are based on non-Soviet material. No personalities are mentioned. References follow each article.

Savitskiy, Ye. M., and M. A. Tylkina. Properties of Titanium and Titanium Alloys 103

This is a survey of the physical and mechanical properties of titanium and titanium alloys. Data are given on the effect of oxygen, nitrogen, hydrogen, and carbon on the mechanical properties of titanium.

Gudtsov, N. T., and L. D. Mashtakova. Heat Treatment of Titanium and Titanium Alloys 163

The authors discuss work hardening, annealing, grain refining, and other heat-treating methods for titanium and titanium alloys. Also discussed are the effect of alloying elements on heat-treating characteristics, mechanical properties after heat treating, and structural changes at heat treating.

Arzhanyy, P. M. Thermochemical Treatment [Diffusion Coating] of Titanium 187

This article deals with the nitriding, boronizing, and siliconizing of titanium.

Zhelest, A. Ye., A. N. Danil'chenko, and I. M. Pavlov. Forming of Titanium and Titanium Alloys 195

The authors discuss the special features of plastic deformation, general characteristics of cold and hot working, individual forming operations, preparatory and finishing operations, organization of production, and storage and utilization of waste.

Savitskiy, Ye. M., and M. A. Tylkina. Recrystallization of Titanium Alloys 226

Recrystallization of magnesium-reduced and iodide titanium is discussed in reference to its occurrence after cold working, hot forging, annealing, tempering, and hardening. Data are also given on the effect of the annealing temperature on the properties of titanium and the effect of alloying additions on the recrystallization temperature.

Babareko, A. A. Deformation and Recrystallization Textures of Titanium and Titanium Alloys 247

The article deals with textures assumed by titanium and titanium alloys after different forming operations.

Shc..orov, M. Kh., and G. V. Nazarov. Welding and Soldering of Titanium and Titanium Alloys 252

Welding characteristics of titanium are discussed. Data are given on welding and soldering methods.

Melent'yev, B. N., and A. I. Ponomarev. Methods for [Chemical] Analysis of Titanium and Titanium Products 285

Data are furnished on qualitative, volumetric, polarographic, and colorimetric methods of analysis. Phase analysis is also discussed.

Romanov, K. E. Theory and Practice of M[illegible] Titanium Alloys [illegible]

The following topics are discussed: [illegible] ...ility, causes of poor machinab[illegible] ...ants and other fact[illegible] ... titanium alloys, [illegible]

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

Pavlov, I.M.

28(1) PHASE I BOOK EXPLOITATION SOV/2156

Soveshchaniye po kompleksnoy mekhanizatsii i avtomatizatsii tekhnologicheskikh protsessov. 2nd, 1956.

Avtomatizatsiya mashinostroitel'nykh protsessov; /trudy soveshchaniya/, tom. 1: Goryachaya obrabotka metallov (Automation of Machine-Building Processes; Proceedings of the Conference on Over-All Mechanization and Automation of Technological Process, Vol 1: Hot Metal-Forming) Moscow, 1959. 394 p. 5,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut mashinovedeniya. Komissiya po tekhnologii mashinostroyeniya.

Resp. Ed.: V.I. Dikushin, Academician; Compiler: V.M. Raskatov; Ed. of Publishing House; V.A. Kotov; Tech. Ed.: I.F. Kus'min.

PURPOSE: The book is intended for mechanical engineers and metallurgists.

COVERAGE: The transactions of the Second Conference on the Over-All Mechanization and Automation of Industrial Processes, September 25-29, 1956, have been published in three volumes. This book, Vol. I, contains articles under the general title, Hot Working of Metals. The investigations described in the book were conducted by the Sections for Automation and Hot Working of Metals, under the direction of the following scientists: casting - P.N. Aksenov, D.P. Ivanov and G.M. Orlov; forming - A.I. Tselikov, A.D. Tomlenov and V.T. Meshcherin; welding - G.A. Nikolayev, B.I. Frolov and G.A. Maslov. There are 183 references: 142 Soviet, 34 English, 6 German, and 1 French.

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV I. M.

18(0) PHASE I BOOK EXPLOITATION SOV/2316

Akademiya nauk SSSR. Institut nauchnoy i tekhnicheskoy informatsii

Metallurgiya SSSR, 1917 - 1957; [t.] II (Metallurgy in the USSR, 1917 - 1957; Vol 2) Moscow, Metallurgizdat, 1959. 813 p. Errata slip inserted. 3,000 copies printed.

Ed. (Title page): I. P. Bardin, Academician; Ed. (Inside book): O. V. Popova; Tech. Ed.: P. G. Islent'yeva.

PURPOSE: This book is intended for metallurgists.

COVERAGE: The articles in this collection present historical data on the achievements of Soviet metallurgy, both ferrous and nonferrous, during the period 1917-1957. Advances in theory and practical application are thoroughly discussed. Many of the articles describe the present status of individual branches of metallurgy and give an idea of what may be expected in the future. Advances made in other countries are also discussed. The articles are accompanied by a large number of references. For further coverage, see Table of Contents.

This article is an extensive survey of scientific writings on the rolling process published in various countries including the USSR since 1859. The writings deal with historical development, friction between rolls and metal, force and power relations, deformation, high-speed rolling, and special methods of rolling.

Historical information on the development of engineering standards for the acceptance of rails and on the amount of rails manufactured by openhearth, Bessemer, and Thomas processes is presented. Changes in weight and types of rails, improvements in quality and technique (e.g., quenching from rolling temperature and after reheating, use of alloy steel, etc.) are pointed out. Measures taken for further improvement and elimination of defects are mentioned.

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PAVLOV, I.M.

PHASE I BOOK EXPLOITATION SOV/3559

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. 5 (Investigations of Heat-Resistant Alloys, Vol 5) Moscow, Izd-vo AN SSSR, 1959. 423 p. Errata slip inserted. 2,000 copies printed.

Ed. of Publishing House: V.A. Klimov; Tech. Ed.: I.F. Kuz'min; Editorial Board: I.P. Bardin, Academician, G.V. Kurdyumov, Academician, N.V. Ageyev, Corresponding Member, USSR Academy of Sciences (Resp. Ed.), I.A. Oding, I.M. Pavlov, and I.F. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgical engineers, research workers in metallurgy, and may also be of interest to students of advanced courses in metallurgy.

COVERAGE: This book, consisting of a number of papers, deals with the properties of heat-resisting metals and alloys. Each of the papers is devoted to the study of the factors which affect the properties and behavior of metals. The effects of various elements such as Cr, Mo, and W on the heat-resisting properties of various alloys are studied. Deformability and workability of certain metals as related to the thermal conditions are the object of another study described. The problems of hydrogen embrittlement, diffusion and the deposition of ceramic coatings on metal surfaces by means of electrophoresis are examined. One paper describes the apparatus and methods used for growing monocrystals of metals. Boron-base metals are critically examined and evaluated. Results are given of studies of interatomic bonds and the behavior of atoms in metal. Tests of turbine and compressor blades are described. No personalities are mentioned. References accompany most of the articles.

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

18(5), 18(6) SOV/163-59-1-21/50

AUTHORS: Pavlov, I. M., Shelest, A. Ye.

TITLE: Investigation of the Friction Coefficient of Titanium and Its Alloys in Rolling (Issledovaniye koeffitsiyenta treniya pri prokatke titana i yego splavov)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 1, pp 105 - 112 (USSR)

ABSTRACT: At first the formulas (1), (2), and (3) are quoted from the papers cited by references 1,2, and 3, and the fact is pointed out that these formulas are insufficient. As an alternative formula (4) specifying the coefficient of friction according to the method of the roller torsion meter (Ref 4) is written down. The authors determined the friction coefficient in the hot rolling of titanium and its alloys according to this method which fully stood its test. The forward slip, the overall pressure, and the torque were measured. Two formulas, an accurate, and a simplified one were used to determine the friction coefficient. It was found

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Investigation of the Friction Coefficient of Titanium and Its Alloys in Rolling

SOV/ 16?-59-1-21/50

that the curve representing the friction coefficient versus temperature function in the hot rolling of titanium, its alloys and stainless steel, takes a convex course, the maximum being found in the region of 950 - 1050°. It was further found that the friction coefficient in the rolling of titanium of various types and of its alloys is smaller by a factor of 1.5 than the friction coefficient in the rolling of stainless steel of the type 1Kh18N9T. It is shown that the allotropic transformation of the β-phase into the α- phase which occurs during the cooling of titanium and of its alloys is the cause of the jump-like change in specific pressure, of torque, and of the specific force of friction on the region of the β-α-transformation. There are 6 figures and 5 Soviet references.

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Investigation of the Friction Coefficient of Titanium and Its Alloys in Rolling SOV/1[illegible]-59-1-[illegible]1/50

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: May 31, 1958

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

18(7)
SOV/163-59-2-27/

AUTHORS: Pavlov, I. M., Krupin, A. V.

TITLE: The General Case of Dependence of Stress Concentration on Metal Defects (Obshchiy sluchay zavisimosti kontsentratsii napryazheniy ot defektov metalla)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1959, Nr 2, pp 150 - 157 (USSR)

ABSTRACT: Metal defects (hollows, nonmetallic inclusions) act as concentrators of stress. In a previous paper (Ref 3), the influence of the principal application directions $\alpha = 0^o$ and $\alpha = 90^o$ of the deforming force P was investigated (α = angle between principal axis of an oval defect and the direction of force). The present paper investigates the effect of application directions between 0^o and 90^o for determining the coefficient K_{max} in dependence on α and Θ (Θ = angle between principal axis of the defect and the radius vector of the force on the outline of the defect, simultaneously determining the spot most endangered by the maximum stress K_{max}). The influence of an oval defect (Fig 1) with a ratio of the semiaxes

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

The General Case of Dependence of Stress Concentration on Metal Defects SOV/163-59-2-27/48

$R = \frac{b}{a} = 0.41$ was investigated by the method of photoelasticity by means of the projector-polarizing apparatus PPU-4. Figure 2 shows the stress distribution near the defect outline according to the angle of application α. The computation was carried out by the formulas derived by G. V. Kolosov (Ref 4) and G. N. Savin (Ref 5). The values for K obtained are given in table 1 for different values of α. Figure 3 shows the values graphically, K_{max} being the envelope of the family of curves $K = f(R,\theta,\alpha)$. The change of K_{max} is computed (Table 2) and represented in figure 5. Figure 4 shows that the computations on the basis of the formulas of the two authors mentioned are in good agreement with the experimental values. There are 5 figures, 2 tables, and 5 Soviet references.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: August 12, 1958

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

SHELEST, A.Ye.; DANIL'CHENKO, A.N.; PAVLOV, I.M.

Drop forging and rolling of titanium and its alloys. Itogi nauki: Tekh. nauki no.2:195-225 '59. (MIRA 12:9)
(Titanium--Metallography) (Forging) (Rolling (Metalwork))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, Ig.M., doktor tekhn.nauk; ZAYTSEV, M.L.

Comparing the designs of rolls by the intensity of deformation. Sbor.trud.TSNIICHM no.16:111-121 '59. (MIRA 12:5)

1. Chlen-korrespondent AN SSSR (for Pavlov).
(Rolling (Metalwork))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, Ig.N.; TETERIN, P.K.; KLYAMKIN, N.L.; MUSORINA, I.Ye.

Designing rolls for shaping two-ply pipes. Sbor.trud. TSNIICHM no.16:251-268 '59. (MIRA 12:5)
(Rolls (Iron mills))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

BUKHVOSTOV, Nikolay Alekseyevich; PAVLOV, I.M., retsenzent; MARKIZ, Yu.L., inzh., red.; MARKIZ, Yu.L., red.izd-va; SMIRNOVA, G.V., tekhn.red.

[Over-all method of solving power engineering problems of rolling] Kompleksnyi sposob resheniia energotekhnologicheskikh parametrov prokatki. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1960. 113 p. (MIRA 13:3)

1. Chlen-korrespondent AN SSSR (for Pavlov).
(Rolling mills)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I. M.

PHASE I BOOK EXPLOITATION SOV/4782

Moscow. Institut stali

Proizvodstvo i obrabotka stali i splavov (Production and Treatment of Steel and Alloys) Moscow, Metallurgizdat, 1960. 462 p. (Series: Its: Sbornik, 39) 2,100 copies printed.

Ed.: Ye. A. Borko; Ed. of Publishing House: S. L. Zinger; Tech. Ed.: M. R. Kleynman; Editorial Council of the Institute: M. A. Glinkov, Professor, Doctor of Technical Sciences; R. N. Grigorash, Docent, Candidate of Technical Sciences; V. P. Yelyutin, Professor, Doctor of Technical Sciences; A. A. Zhukhovitskiy, Professor, Doctor of Chemical Sciences; I. N. Kidin, Professor, Doctor of Technical Sciences; B. G. Livshits, Professor, Doctor of Technical Sciences; A. P. Lyubimov, Professor, Doctor of Technical Sciences; I. M. Pavlov, Corresponding Member, Academy of Sciences USSR; and A. N. Pokhvisnev, Professor, Doctor of Technical Sciences.

PURPOSE: This book is intended for technical personnel in industry, scientific institutions and schools of higher education, dealing with open-hearth and electric-furnace steelmaking, metal rolling, physical metallurgy, metallography, and heat treatment. It may

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also be used by students specializing in these fields.

COVERAGE: The book contains results of theoretical and experimental investigations of metallurgical and heat-engineering processes in open-hearth and electric furnaces. Data are included on the following: desulfurizing of pig iron outside the blast furnace, interaction of oxides of the carbide-forming metals with solid carbon, the change of content of gases in the bath of the open-hearth furnace in various periods of melting, intensification of the electric melting of steel, etc. Other articles deal with the nonuniformity of deformation in rolling, the study of the continuous rolling process, the dependence of the friction-slippage coefficients in rolling on a number of factors, and other problems in the pressworking of metals. Articles on physical metallurgy and the theoretical principles and techniques of the heat treatment of steel are also included. No personalities are mentioned. References accompany most of the articles. There are 207 references, both Soviet and non-Soviet.

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PHASE I BOOK EXPLOITATION SOV/4042

Leningrad. Universitet

Polyarizatsionno-opticheskiy metod issledovaniya napryazheniy; trudy konferentsii 13-21 fevralya 1958 goda (Optical Polarization Method for Stress Analysis; Transactions of the Conference of February 13-21, 1958). [Leningrad] Izd-vo Leningradskogo univ., 1960. 451 p. Errata slip inserted. 2,400 copies printed.

Resp. Ed.: S.P. Shikhobalov; Ed.: Ye.V. Shchemeleva; Tech. Ed.: S.D. Vodolagina; Editorial Board: S.G. Gutman, L.M. Kachanov, V.M. Krasnov, T.D. Makhutova, N.I. Prigorovskiy, V.N. Proshko, N.S. Rozanov, and Ye.I. Edel'shteyn.

PURPOSE: This collection of 58 articles is intended for scientists and engineers concerned with experimental stress analysis of machine parts and structural components.

COVERAGE: The collection contains reports presented at the conference on optical polarization methods in stress analysis held February 13 - 21, 1958, in Leningrad and attended by 324 delegates including representatives of the People's Republic of China, the Polish People's Republic, the German Democratic Republic, and the Republic of Czechoslovakia. The reports discuss general theoretical problems and new methods of investigation and describe apparatus and materials used in the optical method. Solutions of specific two-dimensional and three-dimensional problems occurring in shipbuilding, aircraft design, engine construction, in various branches of heavy and precision machine design, in mining, metallurgy, hydraulic structures, railroad transport, in structural mechanics, geodynamics, in the control of stresses in products of the glass and electronic industry, etc., are given. Solution of the three-dimensional problem by means of the method of photoelasticity is introduced and the use of this method for the solution of problems associated with plasticity, creep, dynamics, hydrodynamics, etc., is demonstrated. Reports previously published elsewhere are printed here in abbreviated form. No personalities are mentioned. References are found at the end of 47 of the reports.

Optical Polarization Method (Cont.) SOV/4042

XI. VARIOUS FIELDS OF APPLICATION OF THE OPTICAL POLARIZATION METHOD

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

GALLAY, Yakov Samuilovich, dotsent; PAVLOV, Ig.M., red.; GORDON, L.M., red.izd-va; ATTOPOVICH, M.K., tekhn.red.

[Materials on the theory of rolling] Materialy po teorii prokatki. Pod red.I.M.Pavlova. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii. Pt.5. 1960. 608 p.
(MIRA 13:2)

1. Chlen-korrospondent AN SSSR (for Pavlov).
(Rolling (Metalwork))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

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77687
SOV/148-60-1-10/34

AUTHORS: Pavlov, I. M., and Krupin, A. V.

TITLE: The Effect of Defects in Metal on Concentration of Stresses

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, 1960, Nr 1, pp 60-65 (USSR)

ABSTRACT: This is an analytical study of the effect of relative dimensions of main semiaxes (a and b) of defects on coefficient of concentration K. The study is based on the fact that the defects in metal are acting as concentrators of stresses and they affect the concentration of elastic and plastic deformations in metal. The authors state that for the defects of elliptical shape, and within the limits of elasticity, the coefficient K can be determined by Kolosov formula (G. V. Kolosov. Concerning One Application of Functions of Complex Variable to Plane Problem of the Mathematical Theory of Elasticity. Yur'yev University, 1909):

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$$K = 1 + 2\frac{a}{b}.$$

where a and b are main semiaxes. The formula can be used when the defects have a less curved surface than the crystallites, in other words when the radius of defect's curvature is sufficiently large in comparison with the dimensions of crystallites. Therefore, the stresses which depend on boundary conditions change over a wide range and the structure of the substance has no influence on coefficient of concentration. The formula holds for definite values of α and θ when

$$\alpha = 0 \quad \theta = \frac{\pi}{2}, \frac{3\pi}{2}$$

$$\alpha = 90^\circ \quad \theta = 0, \pi,$$

where α = an angle formed by the large semiaxis of defect and the direction of acting force; θ = an angle formed by the same semiaxis and the radius-vector of a given point on the contour of the defect. It follows

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(from Kolosov's equation) that there can be various cases of change of K depending on the change of a and b: (1) a = const; b $\neq$ const; (2) a $\neq$ const; b = const; (3) a and b change simultaneously in the same direction (increase or decrease); (4) a and b change simultaneously but in the opposite direction. These cases are illustrated by the following tables and figures. The first two cases show a linear relation of coefficient K and a/b ratio. The linear relation does not give the means of tracing the rate of changes of K depending on changes of a and b. To solve this problem the authors used a conception that the maximum rate of change of a function takes place in the direction of vector gradient K. (see Table 2 and Figure 2). Rewriting the original Kolosov's equation $K = 1 + 2\frac{a}{b}$ as $K - 1 = 2\frac{a}{b}$ and substituting m for K - 1, the authors derive a surface equation of hyperbolic paraboloid: a = 1/2 mb, shown in Fig. 3. The calculated and experimental values of coefficient K are given in Table 3. The values of this Table were used for

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The Effect of Defects in Metal on Concentration of Stresses

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Table 1. Values K When a = const and b = const.

	a = const, b [illegible] const					a [illegible] const b = const				
a	1,0	4,0	4,0	4,0	4,0	2,0	1,0	7,2	9,8	12,0
b	2,0	4,0	7,26	9,8	12,0	4,0	4,0	4,0	1,0	4,0
$\frac{a}{b}$	2,0	1,0	0,55	0,41	0,33	0,5	1,0	1,82	2,45	3,0
K	5	3	2,10	1,82	1,66	2,0	3,0	7,61	5,9	7

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The Effects of Defects in Metal on Concentration of Stresses

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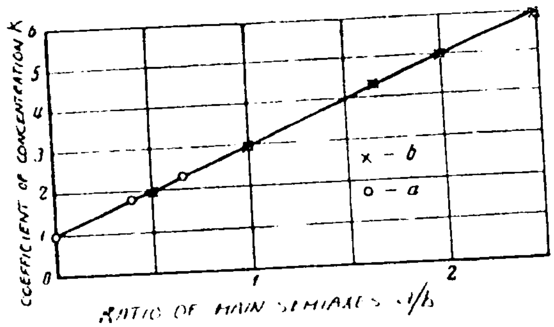

Fig. 1. Linear relation of coefficient K and a/b.
a = const; b = const.

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The Effects of Defects in Metal on Concentration of Stresses

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Table 2. Values of partial derivatives for various values of a and b.

$2a$	$2b$	$\frac{\partial K}{\partial a}$	$\frac{\partial K}{\partial b}$
0,5	4,0	--	0,125
4,0	4,0	--	1,0
7,26	4,0		1,81
9,8	4,0		2,45
12,0	4,0		3,0
4,0	0,5	8,0	--
4,0	4,0	1,0	
4,0	7,26	0,55	—
4,0	9,8	0,41	—
4,0	12,0	0,33	—

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The Effects of Defects in Metal on Concentration of Stresses 77687 SOV/148-60-1-10/34

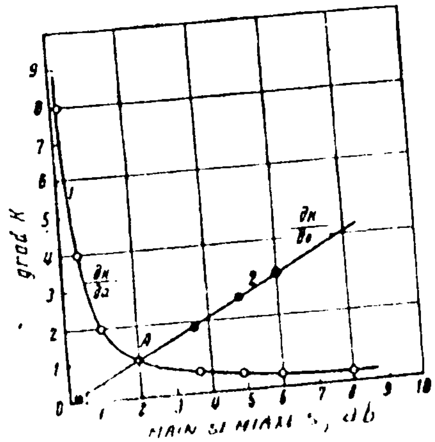

Fig. 2. Curves of rate of changes for coefficient of concentration K.

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The Effects of Defects in Metal on Concentration of Stresses

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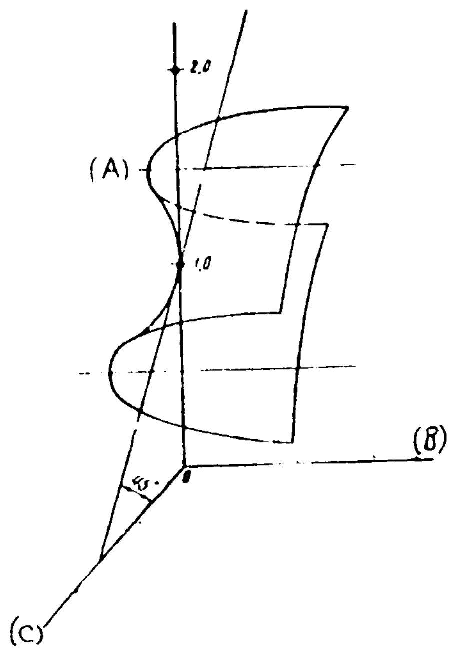
Fig. 3. Geometrical interpretation of the relation a = 1/2 mb: (A) coefficient of concentration of stresses; (B) large semiaxis of defect a; (C) small semiaxis of defect b.



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The Effects of Defects in Metal on Concentration of Stresses 77687

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Table 3. Calculated and experimental values K.

$2a$	$2b$	$\frac{2a}{2b}$	$K = 1 + 2\frac{a}{b}$	$2a$	$2b$	$\frac{2a}{2b}$	$K = 1 + 2\frac{a}{b}$
0,5	2,0	0,25	1,5	2,0	2,0	1,0	3,0
4,0	2,0	2,0	5,0	2,0	4,0	0,5	2,0
7,26	2,0	3,68	8,26	2,0	7,26	0,27	1,54
9,8	2,0	4,9	10,8	2,0	9,8	0,20	1,40
11,0	2,0	5,5	12,0	2,0	12,0	0,17	1,34
12,0	2,0	6,0	13,0				
0,5	4,0	0,125	1,25	4,0	2,0	2,0	5,0
4,0	4,0	1,0	3,0	4,0	4,0	1,0	3,0
7,26	4,0	1,82	4,64	4,0	7,26	0,55	2,1
			5,9*				1,82*
9,8	4,0	2,45	5,5	4,0	9,8	0,41	1,8
12,0	4,0	3,0	7,0	4,0	12,0	0,33	1,66

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Table 3. (cont'd)

0.5	6.0	0.08	1.16	6.0	2.0	3.0	7.0
4.0	6.0	0.66	2.32	6.0	4.0	1.5	4.0
7.26	6.0	1.21	3.42* / 3.5	6.0	7.26	0.83	2.66* / 2.8
9.8	6.0	1.63	4.26	6.0	9.8	0.61	2.22
12.0	6.0	2.0	5.0	6.0	12.0	0.5	2.0
0.5	8.0	0.06	1.12	8.0	2.0	4.0	9.0
4.0	8.0	0.5	2.0	8.0	4.0	2.0	5.0
5.5	8.0	0.67	2.38	8.0	7.26	1.1	3.2
7.26	8.0	0.91	2.82	8.0	9.8	0.81	2.62
9.8	8.0	1.25	3.5	8.0	12.0	0.66	2.32
12.0	8.0	1.5	4.0	8.0	–	–	

*Denominator--experimental values of coefficients of concentration.

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The Effects of Defects Metal on Concentration of Stresses 77687
SOV/148-60-1-10/34

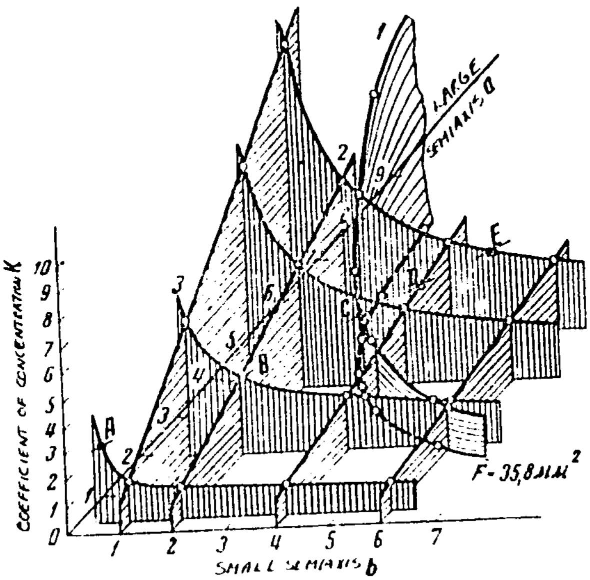

Fig. 4. A volumetric diagram of relation of coefficient K and the values of a and b semiaxes of the defect: (1) a ≠ const, b ≠ const; (2) a ≠ const, b = const; (3) a = const, b ≠ const.

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

The Effects of Defects in Metal on Concentration of Stresses

77687
SOV/148-60-1-10/34

plotting the volumetric diagram shown in Fig. 4. The calculated K values were obtained for elliptical shape defects with area F = πab. The authors refer to the previous work on the subject and conclude that the character of curves of K changes show that notwithstanding the equality of defect's area the concentration of stresses, caused by them, is not identical and depends on a number of factors (shape, ratio of axes, orientation, etc). Therefore the defects equal by the area but different by their geometric shape cannot be put in the same class. This should be considered when developing the corresponding specifications. There are 5 figures; 4 tables; and 5 Soviet references.

ASSOCIATION: Moscow Steel Institute (Moskovskiy institut stali)

SUBMITTED: February 10, 1959

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APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

[illegible]

AUTHORS: Pavlov, I. M., [illegible]

TITLE: Investigation of Relationship Between [illegible] κ, β, and γ [illegible] Longitudinal Rolling

PERIODICAL: Izvestiya [illegible] [illegible] Chernaya metallurgiya, [illegible] Nr [illegible] (USSR)

ABSTRACT: This is a report concerning the determination of [illegible] of critical angle γ during rolling of lead and [illegible] samples and calculation of theoretical values for the same angle γ [illegible] the basis of Wink's equation for forward slip; also an investigation of the relationship between the angles κ, β, and γ during rolling of the same samples. The angle of friction β [illegible] mined by an oscillogram (a mean value of the [illegible] friction over the whole surface). The [illegible] firms the correctness of Wink's equation [illegible]

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Investigation of Relationship Between Angles K, β, and γ ... Rolling

SOV/...

...ing, which was never to be checked, and the ... bility of the method of sectional torsion meter for accurate determination of angle γ. The authors refer to previous work on the subject of I. M. Pavlov, I. Ya. Tarnovskiy, and their own, and derive the new equations. Figures ... and ... show the curves in the region of deformation. The experimental diagram ($\gamma = \varphi(K)$ when β = const) for lead coincided exactly with the theoretical, corresponding to Eq (1)

$$\gamma = \frac{\beta}{2}\left(1 - \frac{\beta}{2K}\right) \quad (1)$$

On the basis of their theoretical and experimental study, the authors make the following statements: (1) In a number of cases (when there is no work hardening or widening) referring to rolling of rectangular strip, a satisfactory accuracy can be obtained by using Eq. (1), above. (2) When, due to uneven distribution of pressure (work hardening) uneven temperature of metal in the roll pass, etc., the resultant

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Investigation of Relation ... K, β, and γ ... Rolling

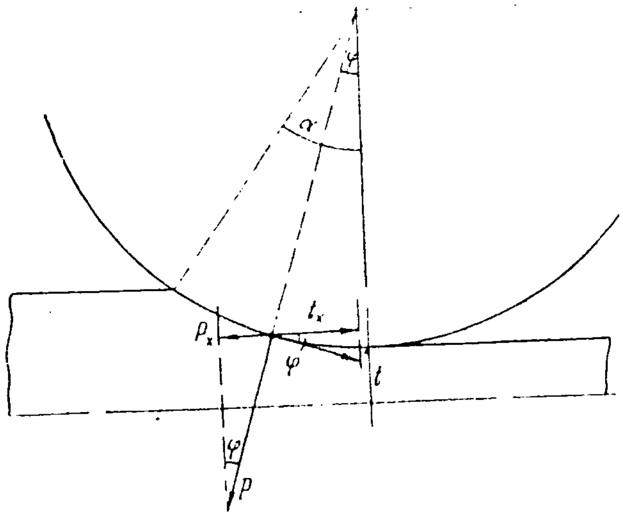

Fig. 1. Forces acting in the hearth of the deformation.

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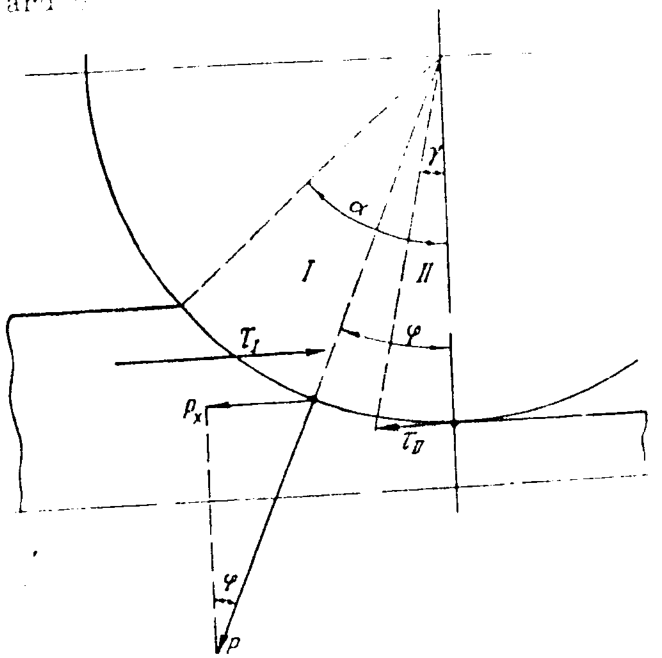
Caption to Fig 2 on Card 5



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Investigation of ...

... β ...

Rolling

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"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R00123

Investigation of [illegible] Angles κ, β [illegible] γ [illegible] Rolling 507/[illegible]

[illegible]

$$C_1 \; \frac{'}{2} (1 - C_2 C_3 \; \frac{'}{2})$$ (2)

where [illegible] forces of friction in the cases of forward slip γ and backward slip (κ [illegible] γ) [illegible] resultant force due to the increase of contact [illegible] C_2 = displacement of resultant force due to change of shape of contact surface (because of widening). The coefficients should be defined more accurately [illegible] [illegible]

[illegible] Metal [illegible]

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Investigation of [illegible] Angles α, β, and γ [illegible] Rolling SOV/[illegible]

account the actual shape of contact surface and the corresponding boundaries of the zones of forward slip and backward slip. The analysis of all simplified formulas and a review of their accuracy is considered desirable. There are [illegible] figures; and [illegible] Soviet references.

ASSOCIATION: Moscow Steel Institute and Institute of Metallurgy of the Academy of Sciences of the USSR (Moskovskiy institut stali i Institut metallurgii AN SSSR)

SUBMITTED: January [illegible]

Card [illegible]

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

PAVLOV, I.M.; GANIN, N.P.; YEGOROV, B.V.; SHRLEST, A.Ye.; SYUY TSUO-KHUA

Use of rotary bearings to investigate the rolling process. Izv. vys. ucheb. zav.: chern. met. no.1:84-87 '60. (MIRA 13:1)

1. Institut metallurgii AN SSSR.
(Rolling (Metalwork))

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0012396

"APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R001239

S/509/60/000/004/009/024
E193/E183

AUTHORS: Pavlov, I.M., and Piryazev, D.I.

TITLE: Specific Pressure in Cold Rolling (Cold Reducing) of Tubes

PERIODICAL: Akademiya nauk SSSR. Institut metallurgii. Trudy, No.4, 1960. Metallurgiya, metallovedeniye, fiziko-khimicheskiye metody issledovaniya, pp.123-134

TEXT: Problems such as the determination of the roll pressure in tube rolling, roll pass design, and assessment of the degree of wear of various parts of the rolling mill, become easier to deal with if data on the magnitude and distribution of specific pressure are available, and if it is known how these parameters are affected by other variables of the process. Since the only experimental data on this subject are those due to Yu.F. Shevakin (Ref.5) the investigation described in the present paper was undertaken in order to study the effect of feed, elongation, and the magnitude of absolute and relative deformation on the specific pressure and its distribution along both the deformation region (contact zone) and the roll pass (reducing

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